

○ **FEATURE  
ARTICLE**



Res URate

1Q 2010: 3.2%

1Q 2011: 2.4%



Inclusive  
Growth

social  
capital

Income  
mobility

# PROGRESSIVE SOCIETY

Demographics

skills &  
Education

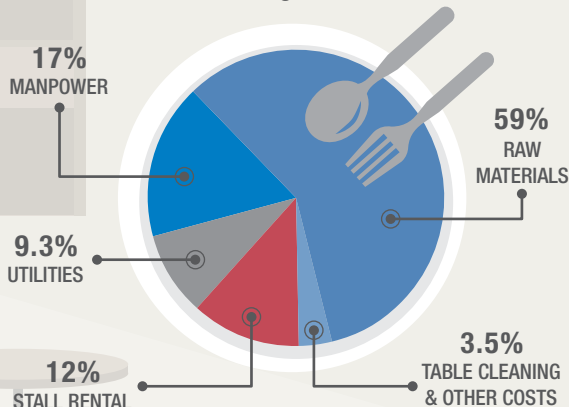


## FEATURE ARTICLE

# EXAMINING THE COST DRIVERS OF HAWKER FOOD PRICES

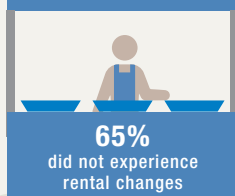
Raw materials constitute the largest cost component for the average hawker

Cost components for the average hawker stall



The majority of hawkers who raised food prices did not experience rental changes

AMONG STALLS WHICH RAISED FOOD PRICES



AMONG STALLS WHICH EXPERIENCED RENTAL CHANGES



Policies to moderate hawker stall rentals

No subletting and assignment of hawker stalls

Removal of reserve rents (i.e., minimum acceptable bid)

Policies to increase accessibility of affordable food

Increase supply of hawker centres

Develop an online platform to publish prices and locations of affordable food

## FINDINGS

Food prices are more sensitive to raw material costs than rental costs



1% INCREASE IN RAW MATERIAL COSTS

RESULTS IN



RENTAL

1% INCREASE IN RENTAL COSTS

RESULTS IN



Hawkers in the CBD raise their prices by a greater amount for the same increment in rentals



**CBD**  
HIGHER RENTAL COST  
PASS-THROUGH



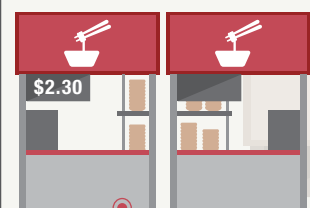
**OUTSIDE CBD**  
LOWER RENTAL COST  
PASS-THROUGH

The price of a particular food item in a hawker centre tends to be lower when more stalls sell the same food item

HAWKER CENTRE 1



HAWKER CENTRE 2



On average, the price is 8.4% lower when there is one other similar stall

## EXECUTIVE SUMMARY

- Hawker centres are an integral part of the Singaporean way of life, offering a wide selection of affordable food to Singaporeans in a clean and hygienic environment. This study looks at the cost structure of hawker stalls and examines the relationship between the various cost components and hawker food prices.
- We find that the largest cost component for hawker stalls is raw material costs, which account for 59 per cent of their total costs on average. Manpower and rental costs represent the second and third largest cost components, accounting for much smaller shares of 17 per cent and 12 per cent of total costs respectively.
- Our findings suggest that hawker food prices are affected by a range of factors. Regression analysis shows that an increase in the cost of raw materials is associated with a larger increase in hawker food prices than an increase in rental costs. Demand factors also appear to influence the extent of pass-through from rentals to hawker food prices. Lastly, we find evidence that competition dampens hawker food inflation.

*The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Ministry of Trade and Industry (MTI), the Ministry of Environment and Water Resources (MEWR), or the Government of Singapore.<sup>1</sup>*

## INTRODUCTION

Hawker centres were built by the Government between the 1960s and 1980s to re-settle street hawkers into permanent, purpose-built buildings. Hawker centres have since become an integral part of the Singaporean way of life, offering a wide selection of food to Singaporeans in a clean and hygienic environment at affordable prices. They complement coffee shops and food courts by ensuring greater diversity and choice for Singaporeans.

Given the important role that hawker centres play in the Singapore society, hawker food inflation often comes under scrutiny. To better understand the drivers of hawker food inflation, this study looks at the cost structure of hawker stalls and examines the relationship between the various cost components and hawker food prices.

The rest of the paper proceeds as follows. We begin by presenting a broad review of the academic literature on cost pass-through to consumer prices. Next, we describe our datasets and provide summary statistics on the key drivers of hawker food prices. Then, we describe our empirical methodology before discussing the findings. Finally, we conclude with a discussion of hawker centre policies.

## LITERATURE REVIEW OF COST PASS-THROUGH TO PRICES

To our knowledge, there has been no empirical study that examines the pass-through of costs to hawker food prices in Singapore. Nevertheless, we have reviewed the academic literature on cost pass-through to prices in different contexts.

<sup>1</sup> The authors would like to thank Yong Yik Wei, Wendy Ang, Walter Theseira, Christopher Tan, Martin Yij, Jeremy Tay, Cheong Wei Seng, Tay Wei Ping, Wen Yu Sheng and NEA's Hawker Centre Division for their comments and suggestions. The authors would also like to acknowledge invaluable statistical support from Alvin Lim, Lim Pei Chin and Alvin Tian (NEA's Research and Statistics Unit), as well as Foo-Wu Wen Chee, Foo Cheng Wen, Phang Ee Li and Lee Ling Xuan (DOS' Consumer Price Indices Section). All remaining errors belong to the authors.

MacDonald and Aaronson (2000) examined the impact of minimum wage increases on restaurant prices in the United States (US) and found that prices rose broadly in line with the costs imposed by the minimum wage increases. The researchers also found that the price responses occurred within a six-month window around the wage increase.

For the wholesale electricity market, Fabra and Reguant (2014) estimated that emissions costs, induced by changes in carbon prices, were almost fully passed through to electricity prices in Spain. They argued that the high-frequency uniform-price auctions that characterised trading in the Spanish wholesale electricity market, coupled with almost perfectly inelastic demand, allowed firms to pass on cost changes almost fully.

## DATA

For our study on the pass-through of costs to hawker food prices in Singapore, two datasets are used. The first dataset is a panel dataset which merges monthly survey data on hawker food prices collected by the Department of Statistics (DOS) and administrative data on rentals collected by the National Environment Agency (NEA) at the stall level to form a balanced panel. The dataset tracks the monthly price and rental of a sample of hawker stalls from July 2012 and April 2014. The sample in the dataset includes both subsidised and non-subsidised hawker stalls.<sup>2</sup> We augment the dataset with data on the import prices of raw materials<sup>3</sup> and average monthly earnings in the food and beverage (F&B) industry<sup>4</sup>, which will be used as proxies for the raw material and manpower costs faced by hawker stallholders respectively.

A second repeated cross-section dataset was created using data collected from the NEA 2012 and 2013 Cost Components Survey.<sup>5</sup> The data collected include average monthly costs incurred by the hawker stallholders on rentals, table cleaning, raw materials, manpower, and so on; as well as the prevailing prices of the food items sold at the stalls at the point of the survey. The surveys in 2012 and 2013 captured different stalls because not all the stallholders responded in both years. While this dataset does not have the panel dimension, it contains richer information on the cost structure of each hawker stall.

## SUMMARY STATISTICS

### Cost Components of Hawker Stalls

Cost structure data from the repeated cross-section dataset indicates that there is a wide range of cost components that could affect hawker food prices [Exhibit 1]. The largest cost component for hawker stalls is raw material costs, which on average account for 59 per cent of their monthly total costs. Manpower costs represent the second-largest cost component for the average stall (17 per cent), followed by rental costs (12 per cent). The significant share of raw material costs in total costs suggests that changes in raw material costs may have a larger impact on hawker food prices than changes in manpower or rental costs.

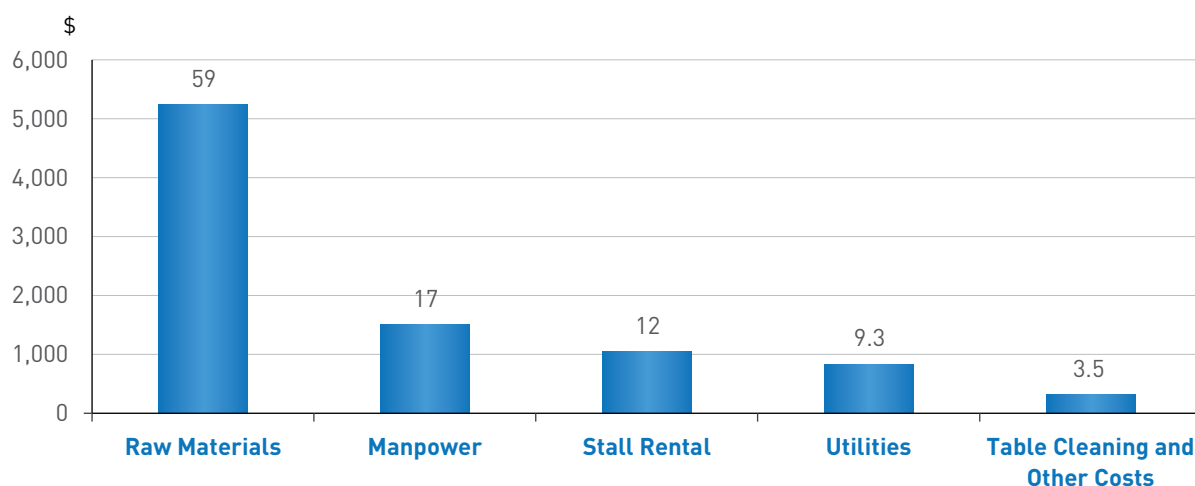
<sup>2</sup> Hawker stall rental subsidies were provided to the original stallholders who re-settled from the streets in the early 1970s to encourage them to move into hawker centres. Rental subsidies were also provided to those who were allocated stalls under the Government's hardship scheme (discontinued in 1980). Among the non-subsidised stalls, there are two types of rentals – tendered rentals and assessed market rentals. NEA tenders vacant stalls out based on a price auction every month. At tenancy renewals after an initial three-year term, stallholders can choose to pay assessed market rentals on their stalls to continue operating the same stall or to bid for a new stall. Assessed market rentals are based on valuations from professional valuation firms.

<sup>3</sup> This is an import price index of raw materials. The index is derived by taking the average of the import price sub-indices for food-related imports (e.g., meat & meat preparations, dairy products & birds' eggs, fish, seafood, cereals and vegetables & fruits).

<sup>4</sup> The F&B industry includes a wide variety of food places in addition to hawker centres. More granular wage data for hawker centres were not available at monthly frequency.

<sup>5</sup> The NEA Cost Component Survey is an annual face-to-face survey of hawker stallholders selling five types of food: chicken rice, fishball noodles, carrot cake, mee siam and drinks. There were about 1,000 respondents in each run of the survey in 2012 and 2013, covering stalls selling the five food items across the 104 hawker centres with cooked food stalls.

**Exhibit 1: Average Monthly Total Cost Components of Hawker Stalls**

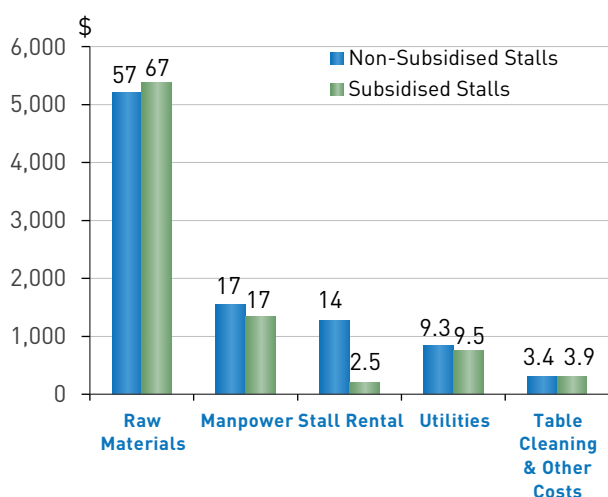


Note: Figures refer to the percentages of costs for a typical stall.  
Source: NEA Cost Component Survey 2012 and 2013

### Comparison of Costs and Prices of Subsidised and Non-subsidised Hawker Stalls

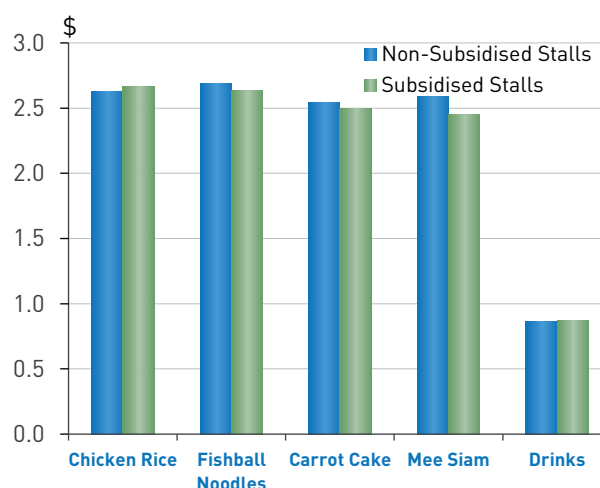
Around half of the 5,500 rental cooked food hawker stalls<sup>6</sup> in Singapore are subsidised and thus enjoy lower rentals. From the repeated cross-section dataset, we find that on average, the monthly rental for a subsidised stall was \$200, far lower than the average of \$1,250 for a non-subsidised stall. Consequently, as a proportion of monthly total operating costs, rental accounts for 2.5 per cent of the total costs of a subsidised stall, and 14 per cent of the total costs of a non-subsidised stall [Exhibit 2]. The monthly total operating costs of the two types of stalls also vary, with costs averaging \$8,000 for subsidised stalls compared to \$9,200 for non-subsidised stalls. Despite the difference in costs, the food prices of subsidised and non-subsidised stalls are broadly similar across most food types [Exhibit 3]. One possible reason could be that hawkers price their food based on what the market can bear, rather than solely based on their costs.

**Exhibit 2: Average Monthly Total Cost Components of Hawker Stalls by Stall Type**



Source: NEA Cost Component Survey 2012 and 2013  
Note: Figures refer to the percentages of costs for a typical stall.

**Exhibit 3: Average Monthly Food Prices by Food Type and Stall Type**



Source: NEA Cost Component Survey 2012 and 2013

<sup>6</sup> In total, there are around 6,100 cooked food stalls in hawker centres throughout Singapore, of which around 600 were sold to incumbent stallholders on 20-year leases under the Stall Ownership Scheme between 1994 and 1997. As these stalls do not pay monthly rentals, they are excluded from our analysis. Of the remaining 5,500 stalls, around half of them enjoy rental subsidies from the Government.

## Stall-level Changes in Rentals and Prices

To further investigate the relationship between rentals and food prices, we turn to the panel dataset. We find that among the hawker stalls which increased food prices between July 2012 and April 2014, only about a third had experienced rental changes [Row (B), Exhibit 4]. For these stalls, the change in food prices occurred with an average lag of four to six months after the change in rentals occurred. Conversely, among the stalls which did not experience rental changes, 39 per cent of them (mostly subsidised stalls) raised their food prices [Column (I), Exhibit 4]. By comparison, only a slightly higher 46 per cent of those which experienced rental changes changed their food prices [Column (II), Exhibit 4]. These summary statistics suggest that a significant proportion of stalls raised food prices for reasons other than an increase in stall rentals.

**Exhibit 4: Breakdown of stalls which changed rentals and/or food prices**

	No change in rental (I) (%)		Change in rental* (II) (%)	Total (%)
	Subsidised stalls	Non-subsidised stalls	Non-subsidised stalls	
No change in food prices (%) (A)	41	0.7	17	59
Change in food prices (%) (B)	24	3.0	14	41
Total (%)	65	3.7	31	100

\* None of the subsidised stalls saw an increase in rental between July 2012 and April 2014.

Note: Figures may not sum due to rounding.

Source: NEA's rental data and DOS' price data

## METHODOLOGY

### Estimating the Pass-through of Costs to Hawker Food Prices

We next use a fixed effects regression model with the panel dataset to estimate the impact of various cost components on hawker food prices. Specifically, our model controls for stall-level fixed effects. This allows us to control for the effect of all unobserved, time-constant factors that may affect the prices of hawker food sold by individual stalls, including the quality of food, the stall location within the hawker centre and the location of the hawker centre. To proxy for changes in raw material and manpower costs, we include the import price index of raw materials and the average monthly earnings in the F&B industry respectively in the regression. The regression specification is thus as follows:

$$price_{ijt} = \beta_1 rent_{ijt} + \beta_2 SNCC_{ijt} + \beta_3 controls_t + \mu_i + \epsilon_{ijt} \quad (1)$$

where,  $price_{ijt}$  is the log of the average food price index at stall  $i$  in hawker centre  $j$  at time  $t$ ,

$rent_{ijt}$  is the log of the rental at stall  $i$  in hawker centre  $j$  at time  $t$ ,

$SNCC_{ijt}$  is the service and conservancy charges paid by stall  $i$  in hawker centre  $j$  at time  $t$ ,

$controls_t$  is a vector of macro indicators (e.g., import price index of raw materials, import price index of gas, and average monthly earnings in the F&B industry) at time  $t$ ,

$\mu_i$  is a set of stall-level fixed effects,

$\epsilon_{ijt}$  is a random shock to stall  $i$  in hawker centre  $j$  at time  $t$ .



The specification above includes only selected macro indicators as controls, and does not control for all time-varying factors which affect hawker stalls. For instance, there may be changes in aggregate demand for food (e.g., changes in preferences) which affect all hawker stalls. Hence, in another specification, we control for all time-varying factors with the inclusion of time fixed effects<sup>7</sup>:

$$price_{ijt} = \beta_1 rent_{ijt} + \beta_2 SNCC_{ijt} + \mu_i + \mu_t + \epsilon_{ijt} \quad (2)$$

where, in addition to the previously defined variables,  $\mu_t$  is a set of time fixed effects.

We also repeat specification (2) separately for hawker stalls located in the Central Business District (CBD) and outside the CBD to explore geographical effects and the relevance of demand-side factors in influencing cost pass-through. The inclusion of time fixed effects in this regression allows us to control for changes in demand preferences over time, thereby allowing us to isolate the effect of region-specific differences in demand.

### Estimating the Effect of Competition on Hawker Food Prices

In addition, we explore the effect of competition on hawker food prices. Specifically, we use the repeated cross-section dataset to examine whether having more stalls selling the same type of food within a hawker centre has an impact on hawker food prices.<sup>8</sup>

$$price_{ij} = stall_{ij} + \beta controls_{ij} + \mu_t + \epsilon_{ij} \quad (3)$$

where,  $price_{ij}$  is the log of the average food price at stall  $i$  in hawker centre  $j$ ,  
 $stall_{ij}$  is a vector of dummy variables indicating the number of stalls selling the same type of food as stall  $i$  in hawker centre  $j$ ,  
 $controls_{ij}$  is a vector of controls for the various cost components (e.g., rental costs, raw material costs, manpower costs, utilities charges and table cleaning charges) at stall  $i$  in hawker centre  $j$ ,  
 $\mu_t$  is a set of time fixed effects,  
 $\epsilon_{ij}$  is a random error associated with stall  $i$  in hawker centre  $j$ .

## RESULTS AND DISCUSSION

### The Pass-through of Costs to Food Prices

Our fixed effects regression analysis using the panel dataset corroborates the hypothesis that changes in hawker food prices are driven by a range of factors. Among the various factors, we find that the largest contributor to changes in food prices is raw material costs, with a 1 per cent increase in raw material costs associated with a 0.56 per cent increase in food prices [Column (1), Exhibit 5]. By contrast, a 1 per cent increase in rental costs only results in a 0.03 per cent increase in food prices. In other words, a \$500 increase in monthly raw material costs leads hawker stalls to raise prices by \$0.20 on average, while the same increase in monthly rental costs leads stalls to raise prices by only \$0.05 on average. The finding that rental costs only have a small impact on food prices is also robust to the more stringent specification controlling for time fixed effects [Column (2), Exhibit 5].

<sup>7</sup> Including the set of time fixed effects precludes the use of the macro indicators in specification (1).

<sup>8</sup> This assumes that the number of stalls selling the same type of food is a proxy for competition and is randomly distributed across hawker centres. If factors influencing the demand for certain food types lead some hawker centres to have a larger number of stalls selling those food types, there would be an upward bias in the  $stall_{ij}$  coefficients. As our coefficient estimates are negative, the presence of such demand factors would bias our results towards not finding any effects. The fact that our estimates remain negative and statistically significant despite the potential upward bias provides strong evidence that competition has a dampening effect on food prices.



Exhibit 5: Effect of Cost Components on Hawker Food Prices

Specification	(1)	(2)
$rent_{ijt}$	0.0302*	0.0291**
$SNCC_{ijt}$	-0.00730	-0.0298
<i>Macro Indicators</i>		
Table cleaning charges	0.0249**	-
Import price index of raw materials	0.559**	-
Price of gas	0.0486*	-
Average monthly earnings of F&B industry <sup>9</sup>	-0.00895	-
Stall-level Fixed Effects	Yes	Yes
Time Fixed Effects	No	Yes

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Sample based on NEA's rental data and DOS' price data

### Cost pass-through within and outside the CBD

We next divide the sample into stalls in hawker centres located in the CBD and those in hawker centres located outside the CBD, and then run separate regressions on the two samples. Our hypothesis is that the demand for hawker food is more inelastic in the CBD because of two factors. First, the clientele mix in the CBD is likely to consist of a higher proportion of office workers, who tend to have higher purchasing power. Second, there may be fewer affordable alternatives in the CBD, which may reduce the competition for hawkers in the CBD. The more inelastic demand may then result in hawkers in the CBD having a greater pricing power than those outside the CBD.

Our regression results show that hawker stalls located in the CBD pass on more of their rental cost increases to consumers by increasing prices, as compared to hawker stalls located outside the CBD, although the magnitude of the pass-through remains relatively small [Exhibit 6]. This suggests that the extent of cost pass-through to food prices may depend on demand-side factors. Specifically, the willingness to pay for food and the availability (or lack thereof) of nearby food establishments may affect prices.

Exhibit 6: Differences in Rental Costs Pass-through between CBD and non-CBD Stalls

Specification	(3)	(4)
$rent_{ijt}$	0.0259	0.0346**
$SNCC_{ijt}$	-0.0487	-0.0319
Stall-level Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Sample	Outside CBD	Inside CBD

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Sample based on NEA's rental data and DOS' price data

<sup>9</sup> Due to the lack of more granular data at monthly frequency, the average monthly earnings of the F&B industry was used to proxy for general trends in manpower costs in hawker centres. The estimated coefficient should be interpreted with caution as these earnings capture wages across various occupation types such as chefs, waitresses, restaurant supervisors, and a wide variety of food places apart from hawker centres.

## Estimating the Effect of Competition on Hawker Food Prices

Finally, we examine the effect of competition on hawker food prices by running regression specification (3) on the repeated cross-section dataset. We find that having a larger number of hawker stalls selling the same type of food within a hawker centre is associated with lower food prices. For instance, if there is one other stall selling the same type of food in the hawker centre, prices are 8.4 per cent lower, compared to the case where there is no other stall selling the same type of food [Exhibit 7]. The dampening effect of competition on food prices becomes larger as the number of stalls selling the same type of food in the hawker centre increases. With three other stalls selling the same type of food, prices are 29 per cent lower than if no other stall sold the same type of food. These results suggest that increased competition has a moderating effect on food prices.

**Exhibit 7: Effects of Competition on Hawker Food Prices**

Specification	(5)
One other similar stall	-0.0836**
Two other similar stalls	-0.196***
Three other similar stalls	-0.294***
Full set of controls	Yes

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Sample based on NEA Cost Component Survey 2012 and 2013

## CONCLUSION

This study finds that the largest cost component for hawkers is raw material costs which, on average, account for 59 per cent of their total costs. Manpower costs form the second-largest cost component (17 per cent), followed by rental costs (12 per cent). In terms of the pass-through of costs to hawker food prices, our analysis shows that food prices are more sensitive to raw material costs, compared to other cost components including rental costs. Furthermore, we find that demand factors are likely to influence cost pass-through, while competition by stalls selling the same type of food within a hawker centre may have a dampening effect on food prices.

While the findings show that stall rentals are not the main driver of hawker food prices, the Government has continued to strive to moderate rentals to encourage hawkers to provide affordable food. In this regard, about 50 per cent of hawker stalls are currently paying subsidised rentals and most of them have not experienced any rental increases in recent years.<sup>10</sup>

The Government has also taken various measures to moderate hawker stall rentals. First, the Government disallowed the practice of sub-letting or assignment of hawker stalls to prevent stallholders who have no intention of operating the stalls themselves from engaging in rent-seeking behaviour which could drive up food prices. This policy took effect on new stallholders from April 2012.<sup>11</sup> A three-year grace period was given to existing non-subsidised stallholders, which means that from April 2015 onwards, they too will have to personally operate their stalls.<sup>12</sup> Stallholders who do not abide by these requirements will have their tenancies terminated.

<sup>10</sup> Rentals for subsidised hawker stalls are only revised if a hawker centre has been upgraded. The revision of subsidised rentals was from \$160 prior to upgrading to \$192 or \$384, depending on whether the hawker centre had undergone standard upgrading or was rebuilt. All hawker centre upgrading projects have been completed as of 2012, and the rentals for subsidised stalls have not changed since then.

<sup>11</sup> Since April 2012, there have been more than 1,900 new cooked food stallholders. NEA has taken action against 64 of them for non-personal operation of their stalls.

<sup>12</sup> Subsidised stallholders are already not permitted to sublet their stalls under existing hawker policy.

Second, the Government has removed the concept of reserve rent for tendered stalls since March 2012. This has benefited tenderers. The average tendered rental for new stalls has generally declined, with some cooked food stalls being awarded for just \$1 in rental per month, although stalls in more popular hawker centres continued to attract high bids. Lower tendered rentals will ultimately feed into lower assessed market rentals for existing stallholders. While there is a time lag of up to three years for the declining trend of tendered rentals to feed into the assessed market rental valuation, the rate of increase of the average market rental for cooked food stalls has already fallen to a third of that in 2013. As of 31 December 2014, about 87 per cent of cooked food stallholders are paying monthly rental of \$1,500 or lower.

In order to make affordable hawker fare accessible to more Singaporeans, the Government is also increasing the supply of hawker centres. MEWR has announced that as part of a new hawker centre building programme, 20 new hawker centres will be built by 2027. The first two will be opening in Bukit Panjang and Hougang later this year.

Lastly, MTI and NEA also plan to enhance the dissemination of information on low-cost hawker food options with the development of an online platform to publish the prices and locations of affordable hawker food. This will allow comparability of prices and play a part in further moderating food prices.

*Contributed by:*

Leong Chi Hoong, Assistant Director  
Environmental Policy Division  
Ministry of the Environment and Water Resources

Jamie Poh, Senior Economist  
Manpower Planning and Policy Division  
Ministry of Manpower

Regina Ng, Economist  
Dr Andy Feng, Senior Economist  
Tan Kok Kong, Principal Economist  
Economics Division  
Ministry of Trade and Industry

## REFERENCES

Aaronson, D., and MacDonald, J. (2000), "How do retail prices react to minimum wage increases?", Federal Reserve Bank of Chicago, WP 2000-20.

Fabra, N., Reguant, M. (2014), "Pass-through of emissions costs in electricity markets", American Economic Review 104(9), pp 2872-2899.

